

## SUB-DOPPLER SPECTROSCOPY OF THE C–O STRETCHING FUNDAMENTAL BAND OF METHANOL BY USING MICROWAVE SIDEBANDS OF CO<sub>2</sub> LASER LINES

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The infrared spectra of the C–O stretching fundamental band of methanol have been studied for the  $(\nu_t, E, K) = (1, E, 2)$  and  $(1, E, 5)$  sequences by a CO<sub>2</sub> sidebands laser sub-Doppler spectrometer <sup>a</sup>. The R- and Q-branch transitions of  $\nu_{\text{CO}} = 1 \leftarrow 0$  for these two level sequences have been assigned and their frequencies have been measured with an accuracy of 0.15 MHz. These assignments have been made by observing Stark effects and by using the Ritz's combination principle. For R-branch lines of the  $(1, E, 2)$  sequence, the observed frequencies agree with the results of Lees et al. <sup>b</sup> within experimental uncertainties. As for transitions belonging to the  $(1, E, 5)$  sequence, which was assigned only for R(6), Q(7) and P(8) previously, <sup>c</sup> transitions involving  $J = 5, 7, 9, 10, 12, 14$  and 16 have been assigned.

Term values of the observed transitions of the  $(1, E, 2)$  and  $(1, E, 5)$  sequences in the  $\nu_t = 1$  state have been given by using the ground state term values in Ref. 3 and their Taylor series expansion coefficients of  $J(J + 1)$  have been determined by a least-squares fit.

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<sup>a</sup>Z. D. Sun, F. Matsushima, S. Tsunekawa and K. Takagi, paper RJ06 at the "54<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy", Columbus, Ohio (1999).

<sup>b</sup>R. M. Lees, I. Mukhopadhyay, and J. W. C. Johns, *Opt. Commun.* **55**, 127(1985),

<sup>c</sup>G. Moruzzi, B. P. Winnewisser, M. Winnewisser, I. Mukhopadhyay, and F. Strumia, *Microwave, infrared and laser transitions of methanol, Atlas of assigned lines from 0 to 1258 cm<sup>-1</sup>*, (CRC Press, Boca Raton, Fla, 1995).